

Lesson: Nutrition in Marine Algae



The food that is made by producers, such as diatoms and other algae, is used by them for all their growth and energy needs. Utilization of food by living things for growth and energy is called nutrition.

Producers are also called **autotrophs**, a word that means “self-feeders.” Their method of obtaining food is called autotrophic nutrition. The food that is made by producers is also used by other organisms; that is, it is used by the consumers, which are unable to make their own food.

Organisms that live on the food made by other organisms—by eating them—are called **heterotrophs**, a word that means “other-feeders.” This type of food-getting is known as heterotrophic nutrition. Since dinoflagellates both make and ingest food, they are considered to be autotrophs as well as heterotrophs.

Photosynthesis

Diatoms and dinoflagellates have chloroplasts—food factories in which photosynthesis takes place. The word photo means “light,” and synthesis refers to the process of manufacturing large molecules from smaller ones. When you combine the two words, you have photosynthesis, the process by which autotrophs can, in the presence of sunlight, make food (sugar) from simple raw materials (carbon dioxide and water). During this reaction, oxygen gas is produced as a by-product. The following chemical equation summarizes the process of photosynthesis.

Sunlight



Chlorophyll

The chemical equation can be put into words as follows: six molecules of carbon dioxide plus twelve molecules of water, in the presence of sunlight and chlorophyll, yields one molecule of glucose plus six molecules of water plus six molecules of oxygen.

After the oxygen is released by the protists or algae, some of its molecules dissolve in the water. The rest of the oxygen enters the atmosphere at the water’s surface. The oxygen you take in with every breath probably includes some molecules that come from marine algae! How do producers use light to make food? Since the diatom lives in water, the surrounding water (H₂O) moves directly into its cell. And since carbon dioxide gas is dissolved in water, the CO₂ also moves directly into the diatom. After entering the cell, carbon dioxide and water are taken up by the chloroplasts. The chloroplasts contain the

green pigment chlorophyll. It is this green pigment that is able to absorb energy present in light. Chloroplasts use this energy to put together the molecules of water and carbon dioxide to produce or synthesize sugar.

Without photosynthesis, life as we know it could not exist on Earth. Why is photosynthesis so important for living things? During photosynthesis, plants are able to turn the light energy in sunlight into the chemical energy in the sugar glucose. Glucose is used by plants for their own energy needs. Since animals are unable to make their own food from simple compounds, they use the energy present in the compounds made by plants instead. When an animal eats a plant, the chemical energy present in the plant is transferred into the animal, that is, from the producer into the consumer. The next time you eat a filet of fish, remember that the energy in the food you are eating came originally from the energy that is present in sunlight.

Where on the planet does most photosynthesis occur, on land or in the ocean? Many people would probably say on land. After all, people are most familiar with the plants found on farms and in fields and forests. However, land makes up only about 29 percent of Earth's surface, and a large percentage of this land does not even support plant life. So this guess is incorrect. The ocean covers most of Earth's surface. It can support algae and plant life in the areas where light penetrates. So that is where most photosynthesis occurs.

The Cell Theory

So far, you have learned three important facts about living things.

First - all living things are composed of one or more cells.

Second - all cells perform the same basic life functions; for example, they make or obtain their food, they get rid of wastes, and they reproduce.

And third - all cells (and, therefore, all organisms) come from preexisting cells.

These three fundamental facts are part of what is called the cell theory.